

THORNTON (G.B.)

"Diphtheria = Pseudo-Membranous Croup."



Diphtheria—Pseudo-Membranous Croup.

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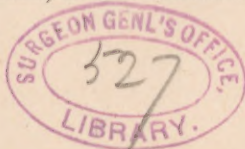
BY G. B. THORNTON, M.D.

President Memphis Board of Health.

As there is a difference of opinion between experienced physicians and a number of noted authors as to the etiology and pathology of diphtheria and pseudo-membranous croup, and I am responsible for the city ordinance regarding them as alike infectious, I have thought it well to introduce the subject to this society for its consideration. If pseudo-membranous croup is not an infectious or contagious disease, it is so like diphtheria in appearance as to cause confusion in diagnosis and might lead to negligence in protecting the community against one of the most actively infectious and fatal diseases of childhood. Aside from the above reason the subject is an especially interesting one just now, in view of the recent discoveries in bacteriology and the practical application of what is recognized as hemato- and sero-therapeutics. However, it is not my purpose to discuss the treatment of either disease in a therapeutical sense, but briefly as practicable as a public health question, and if possible justify the existing city ordinance which regards them as alike infectious.

That diphtheria is a contagious disease is no longer a debatable question. That being conceded, it follows that all proper and available means should be taken to prevent its spread. Hence the important question of early and accurate diagnosis, both for the attending physician who is to treat the case, the family in which it occurs, and the health officer whose duty it is to prevent the spread of the infection in the community.

Some years ago this identical question was before the French Academy of Medicine for discussion, and a committee was



appointed to investigate the etiology and pathology of both, and report the difference if there was any. After due consideration of the subject the committee reported there was practically no material difference.

Diphtheria is essentially a child's disease, though not confined to childhood. One attack does not give immunity from a second or third attack. No particular locality can be named as its peculiar habitat, nor is the disease limited to either season or any particular latitude or longitude. It is more prevalent in winter and in cold, damp, miasmatic atmospheres, thickly-settled localities, crowded quarters, etc., though it sometimes appears in high altitudes and in apparently good conditions of atmosphere. Under such circumstances it may be due to a transmitted infection or a latent predisposition in the individual attacked.

The question as to its commencing as a local or constitutional disease, is another disputed point in its etiology. Without wishing to be considered at all dogmatic, especially in view of recent discoveries and publications, I have inclined to the opinion that it is primarily a constitutional disease, a toxæmia, and the local lesions are simply manifestations of the morbid influence, as the eruption on the skin is the result of variola poison, or the scarlet rash on the surface the first clear diagnostic symptom of scarlet fever, etc. There are those of unquestioned high authority who contend that the disease commences as a local affection, and that constitutional disturbance follows the local inoculation. Upon this point I quote from the current number of the *Journal of the American Medical Association* for Sept. 22, p. 462:

"From the etiology given, based upon the researches of Klebs, Loeffler, Welch, and the chemic pathology of Roux, Yersin and Sidney Martin, the question may be considered as settled that diphtheria is first a local disease caused by the bacillus diphtheria with the membrane at the site of inoculation, and should be treated as such; also that the bacilli diphtheria liberate a ferment which, when absorbed, digests the proteids of the body, forming albumoses and an organic acid. These are the agents producing death; fever and paralysis following diphtheria. This is the secondary or constitutional stage of the disease."

The presence of nests of diphtheritic bacilli or their exudate, the toxine of the bacillus as described by Loeffler and his followers, seems to be now the accepted theory in deciding or diagnosing diphtheria, but to determine this requires skill in bacteriology. Only a few, a very small per cent. of general practitioners are sufficiently expert in chemical analysis and use of the microscope to decide between the diphtheritic bacilli of Klebs and Loeffler and the so-called staphylo- and streptococci in exudate or false membrane of a non-specific character. Besides, such laboratory work as the cultivation of this exudate in glycerin, broth, beef tea, or other media, to determine the presence or absence of the nests of bacilli or the toxine of diphtheria requires time—from twelve to thirty-six hours and possibly longer—and this work must be done by an expert. With a case of true diphtheria to relieve and put in the way of recovery, to say nothing of the protection of other members of the household and the community at large, this is losing valuable time—a loss of opportunity that may prove fatal to the patient and allow the infection to be extended to others.

It is sometimes quite an embarrassing position for the attending physician to be placed in, to report diphtheria and subject the family that gives him its confidence to all the inconvenience of official surveillance, placarding the house, the isolation of the case, stopping the other children from school, and interfering with business and social intercourse, etc., and to have the case prove a simple tonsillitis. But where true diphtheria, one of the most distressing and fatal diseases of childhood, exists, these precautions are necessary and made mandatory by city ordinance. It is better for a community to have suspicious cases reported, or for mistakes in diagnosis to be in favor of isolation and sanitary precaution, than to have real cases of diphtheria run their course and have the infection spread from house to house. I can not now give accurate or large statistics as to the mortality of diphtheria and croup, but feel justified in stating that the mortality in diphtheria is from 30 to 50 per cent. Pseudo-membranous croup is no better. "The average death rate in New York city from diphtheria from 1880 to 1884, four

years, was 42.405 per cent. In Bridgeport, Conn., where statistics were very carefully kept from March, 1885, to March, 1886, one year, there were 131 cases of diphtheria reported with 68 deaths, making a death rate of 51.90 per cent." See *Journal of the American Medical Association*, current number, Sept. 22, 1894, p. 464.

The last annual report of the health commissioner of the city of St. Louis for the year ending March, 1894, was received a day or two ago at the health office. This official report shows that 509 cases of diphtheria were reported and 198 deaths—a mortality of approximately 40 per cent. The same report shows for same time 216 cases of croup and 133 deaths; this is a death rate of over 50 per cent. I have no doubt that a majority of these cases reported as croup were diphtheria, and should have been reported to the health officer to be dealt with as any infectious disease. Possibly they were. I am not informed as to the details of sanitary regulations in that city. But over 50 per cent. of deaths for any one disease is a terrible mortality, and is well worth the study of physicians and sanitarians.

The official report of the health department of the city of Chicago for 1895 shows 975 deaths from diphtheria and 492 from croup. The report does not give number of cases of either disease reported, hence I cannot compare deaths with cases. According to this report the death rate of Chicago from all causes was 16.90 per thousand, calculated upon an estimated population of 1,600,000; the total number of deaths from all causes was 27,083; the percentage of deaths was 3.60; with diphtheria and croup added and considered as one disease, the rate would be 5.41. Cholera infantum is the only disease that leads these singly in the mortality table of zymotic diseases, and the two combined which I am considering as one disease, exceeds that several hundred.

In 1893—last year—there were fifteen cases of diphtheria reported at the Memphis health office, with seven deaths—a mortality of not quite 50 per cent. This year to date, there are twenty-two cases reported inside the city limits, most of them since October 1st, with twelve deaths—a mortality of a little over 50 per cent.

As stated above, it is not my purpose to discuss the general therapeutics of this disease, but will briefly allude to the antitoxin treatment that has gone beyond the experimental stage and demonstrated conclusively its value as a curative agent. As far as I am informed, the mortality of both diphtheria and croup has been approximately 50 per cent. by the best methods heretofore practiced. This is an additional argument that the etiology and pathology of the two are very similar if not identical, and should be dealt with alike by health officers. As yet this lymph or "antitoxin" has not shown the two virtues of vaccine matter, as a therapeutic and prophylactic agent. Vaccine matter is a lasting prophylactic against variola, and if used in the febrile or early eruptive stage of small-pox, acts as a valuable therapeutic agent. It will modify the disease and render it much more manageable. I know this from actual experiment, having tried it in several well-marked cases in the epidemic of 1872-73 in this city. Possibly by further investigation it will be discovered that a permanent prophylactic against the microbes of diphtheria can be produced, as is now the antitoxin. My understanding is that the sero-therapeutic process of Drs. Roux, Behring and Kitasato is antitoxic, but not prophylactic or antiseptic. That is to say, this prepared lymph or antitoxin, when injected into the cellular tissue of a child affected with diphtheria, which is caused by the toxines or product of the microbes or diphtheria bacillus described by Dr. Loeffler, acts therapeutically as an antidote to this poison or ferment, but does not act as a preventive to the microbe itself. In other words it is a curative agent, but has not yet been proven to be a preventive or prophylactic.

Unless the reports we have of this "antitoxin" are exaggerated as a curative agent, it is an inestimable blessing, and it is to be hoped will soon be in the possession of all doctors who may be called upon to treat this fatal disease of childhood.

In conclusion I will say, in enforcing this amended ordinance, regarding diphtheria and pseudo-membranous croup as the same disease, the Board of Health does not wish to be considered as in captious opposition to the views of reputable and honored members of the profession, or to arbitrarily exer-

cise official authority on a simply theoretical question, but to discharge what it conceives to be its duty in practical sanitation for the public good.

DISCUSSION.

Dr. W. W. Taylor: The question, as to whether or not diphtheria and true croup are identical diseases, has long been a debatable and interesting one. However, in the light of recent microscopical studies, it seems to me that the matter has, at last, been incontestably settled. There are two kinds of pseudo membranous inflammations that occur in the upper air passages. To the naked eye they are alike, the chemical and physical properties have been found to be similar, and clinically they are, in almost all respects, identical. A difference is only to be seen in a study of their etiology. By bacteriological research, there is found in the one, the Klebs-Loeffler bacillus, when it is then known to be diphtheria; in the other, there is an entire absence of the Loeffler bacillus and the micro-organism usually seen and to whose presence the inflammation is due, is a streptococcus. When the true diphtheria bacillus is absent, the disease is more properly called pseudo-diphtheria. The term croup is misleading to the laity and presupposes a too exact diagnosis to be made by the general practitioner. It is better with our present means of diagnosis to use some term showing its close kinship to diphtheria. As further evidence to the fact of two kinds of pseudo-membranous inflammations, I will cite the result of studies made at Willard Parker Hospital by Dr. Park of New York. In 159 observations the Loeffler bacillus was found in 54 cases, and in the remainder, 105 cases, it was absent. The mortality in true diphtheria was $46\frac{1}{2}$ per cent.; in pseudo-diphtheria, $5\frac{2}{3}$ per cent. When these exudates form in the larynx, the symptoms of the two diseases are much the same. With true laryngeal diphtheria constitutional symptoms are usually absent on account of the scant supply of lymphatic vessels and glands. The laryngoscope only enables us to see a membrane, but is of no aid in differential diagnosis. That can only be made by a bacteriological examination.

While the facts that have been stated prove to me that diphtheria and true croup are separate and distinct diseases, yet on account of the impossibility of differential diagnosis at the bedside, it is wiser for the general practitioner to always treat and manage them as the same.

Dr. Krauss: As to the ordinance, it is a necessary one and should be lived up to. The statistics quoted by the author

and those quoted by Dr. Taylor show how little reliance can be placed upon statistics in general, if the cases are not honestly and properly grouped.

To be fair, only the laryngeal cases of true diphtheria should be contrasted with croup, which is essentially a laryngeal affection. The reports from continental hospitals show that in laryngeal diphtheria the mortality runs up to 87 per cent.; moreover, the figures quoted by Dr. Thornton were not controlled by bacteriological diagnoses, and many cases were undoubtedly true diphtheria.

I wish to endorse all Dr. Taylor has said. There is no longer any doubt about either the primarily local character of diphtheria, or the non-identity of the two diseases; they are *res adjudicata*. The chief clinical points of distinction for true diphtheria are:

1. The membrane is more grayish to brown, surrounded by a livid halo, and it bleeds readily from slight friction.
2. There is fetor of the breath.
3. There is albuminuria.
4. It is followed by paralysis.

Dr. Thornton's hope that we may find a prophylactic in the remedy can only be partially realized, as can be readily understood if we remember the nature of the serum. It is an albuminous mixture which is brought into the circulation, and, being foreign to the body, must of necessity be sooner or later eliminated. It is not a substance that induces processes in the body, requiring time to run their course, and resulting in an agent generated in the body, like vaccinia, for instance. Prof. Behring believes that an immunity lasting perhaps thirty days may be conferred.

The heilserum not only destroys the bacillus, as has been stated by Dr. Thornton, but contains two separate principles which have been isolated; one is bactero-toxic, the other is toxine-neutralizing.

During my association with Dr. Thornton on the Board of Health I suggested that we furnish diagnoses as the New York Board was doing. Other boards are now doing this, and ours will find it necessary to do so when the serum comes into general use among us, for obvious reasons.

A medicinal dose is said to be harmless, but I do not deem it prudent to use so potent a remedy without having it opposed by the diphtheria poison, and indiscriminate use of this very promising remedy will more quickly bring it into disrepute than anything else.

I think Dr. Thornton's paper a timely one, and fully appreciate the importance of the ordinance.

Dr. Turner: Thanks Dr. Thornton for essay. Has been very close to the hardships of the red tickets, but endorses the practice. In sympathy with view of the disease as constitutional with local manifestations.

Dr. Holder: Wants to call attention to varying of statisticians as to results claimed in similar cases. Would ask Dr. Taylor, who has mild statistics, whether when case where no membrane is visible died, such case is diphtheria or croup. Had one case which died and consultant said it was croup.

Dr. Taylor replies that in laryngeal diphtheritic membrane no clinical diagnosis is possible.

Dr. Jones: Always contended that they were different diseases. Was startled at the statistics quoted by Dr. Taylor. Thinks croup is more dangerous than diphtheria; they die from suffocation. Thinks croup always starts in fauces, and diphtheria in pharynx, generally at tonsil. In inaccessible membrane symptoms are different and distinct; in croup, death before involvement of glands, more fever early, and death early. Thinks it a wise ordinance and expects to live up to it. Does not expect to be censured by patients as an alarmist for reporting such cases; they are very apt to die.

Chairman: Dr. Taylor's statistics refer to cases of membrane, but they say nothing about croup. Croup is an old disease; diphtheria more recent. In diphtheria we have paralysis; but the question is if in croup the child can live long enough for paralysis. Three forms: laryngeal, pharyngeal and nasal; laryngeal is more fatal. Thinks they should be called the same disease and that they are equally fatal.

Dr. Thornton: Has little to add. Looks at it from point of view of a health officer; does not intend to be arbitrary, but believes he is acting in interest of community. As to statistics he only quoted official figures, and believes the high mortality was due to faulty diagnosis. Wants to bring anti-toxin here for use of the profession. Last month an institute was started in New Orleans for its propagation, and believes it will be a blessing. True diphtheria is a most fatal disease.

